RAD
data communications

Next Generation Multiservice Access Node & First Mile

Russia
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TECHNICAL SUPPORT

Contents

Chapter 1
Introduction

1.1 Abstract

Welcome to the Next Generation Multiservice Access Node & First Mile workshop. By the end of this workshop you will know how to set up a TDM Access network to carry different services over different infrastructures using a dumb terminal or Telnet. You will gain the knowledge of how to prepare, install and configure a TDM/PSN application based on the multiservice access node MP-4100.

Two different phases of MP-4100 will be used in this workshop: Phase 2 (MP-4100 **CL.1**), which can be controlled by means of menu accessible through ASCII terminal or Telnet; and Phase 3 (MP-4100 **CL.2**), which has a completely different management approach – Telnet or ASCII terminal using RAD Command Line Interface (CLI). Since this concept is relatively new on the RAD products, please refer to the CLI explanation in the end of this chapter before starting configuration. For a deeper explanation you can refer to the User Manual, "Command Tree" section (page 3-12).

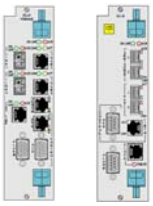
1.2 Tasks

In the table below you will find the different tasks ahead of you.

	Chapter	Tasks	Participating Devices
Task 1	**2**	Management Configuration via Terminal	MP-4100; ASMi-54L; OP-108
Task 2	**3**	ETH over SDH	MP-4100; ASMi-54L; OP-108
Task 3	**4**	Voice over PSN	MP-4100
Task 4	**5**	Voice over SDH	MP-4100
Task 5	**6**	STM-4 Ring Application	MP-4100

1.3 Products

The following products will be used during this workshop:

Megaplex-4100	CL.1 / CL.2	M8E1	MPW-1
			
OP-108C	**ASMi-54C**	**VC-8/FXS**	**Ringer-2100**
			

ASMi-54	OP-108
	

Physical Connections

The physical connections (cables) are specified at the beginning of every task.

Using CLI

The CLI consists of commands organized in a tree structure, starting at the base prompt **mp4100#**. The base prompt is the device name, which can be configured on the system level.

By default the device name is **mp4100**.

Commands that are not global are available only at their specific tree location, while global commands can be typed at any level. To find out what commands are available at the current location, type **?**.

To navigate down the tree, type the name of the next level. The prompt then reflects the new location, followed by **#**. To navigate up, use the global command **exit**. To navigate all the way up to the root, type **exit all**.

At the prompt, one or more level names separated by a space can be typed, followed (or not) by a command. If only level names are typed, navigation is performed and the prompt changes to reflect the current location in the tree.

If the level names are followed by a command, the command is executed, but no navigation is performed and the prompt remains unchanged.

To use **show** commands without navigating, type **show** followed by the level name(s) followed by the rest of the show command.

In the example below the levels and command were typed together and therefore no navigation was performed, so the prompt has not changed.

mp4100# configure port ppp 5/1 bind e1 5/1

mp4100# configure port ppp 5/2 bind e1 5/2

mp4100# configure port ppp 5/3 bind e1 5/3

mp4100# configure port ppp 5/4 bind e1 5/4

mp4100# exit all

In the following example, the levels were typed separately and the navigation is reflected by the changing prompt.

mp4100#

mp4100# configure

mp4100>config# port

mp4100>config>port# ppp 5/1

mp4100>config>port# ppp(5/1)# bind e1 5/1

mp4100>config>port# ppp(5/1)#

You can type only as many letters of the level or command as required by the system to identify the level or command, for example you can enter **config manag** to navigate to the management level.

In addition to being the default prompt, the **#** symbol also indicates a static or already configured entity. The **$** symbol indicates a new dynamic entity that takes several commands to configure. After the configuration is completed, it must be activated by using the **no shutdown** command, as shown in the following example.

mp4100# configure port logical-mac 5/1

mp4100>config>port>log-mac(5/1)$ bind mlppp 5/1

mp4100>config>port>log-mac(5/1)$ no shutdown

mp4100>config>port>log-mac(5/1)$ commit

The **shutdown** command disables a hardware element (such as a port), while **no shutdown** enables/activates it.

The **commit** command updates the candidate database to the running database without saving it.

The **save** command is used to save the user configuration.

CLI commands have the following basic format:

command [parameter]{value1 | value2 | … | valuen} [optional parameter <value>]

where:

{} Indicates that one of the values must be selected

[] Indicates an optional parameter

<> Indicates a value to be replaced by user text

The following keys are available at any time:

? Lists all commands available at the current level

<Tab> Command autocomplete

<Ctrl-E> Logs out

<Ctrl-U> Erases the line

↑ Displays the previous command

↓ Displays the next command

<Backspace> Deletes character

<Ctrl-C> Interrupts current command

<Ctrl-Z> Returns to the device prompt (root)

The following commands are available at any time and at any level:

echo [<text-to-echo>] Echoes the specified text

exec <file-name> [echo] Executes a file, optionally echoing the commands

help [hotkeys] [globals] Displays general help, or optionally just the

hotkeys and/or global commands

history Displays the command history for the current session (by default the history contains the last 10 commands)

info [detail] Displays information on the current configuration

tree [detail] Displays all lower command levels and commands accessible from the current context level

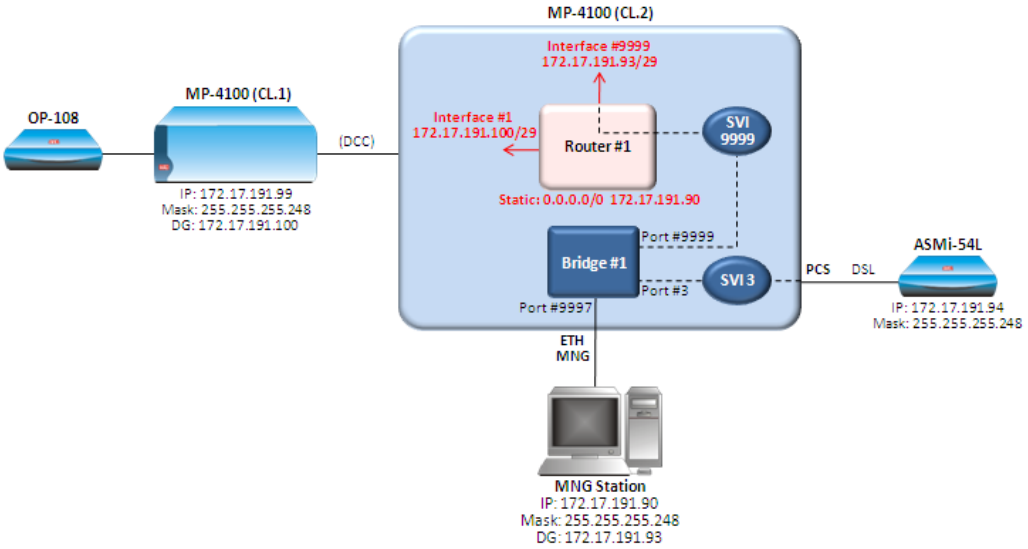
CLI commands can be gathered into text files called scripts. They can be created using a text editor, by recording the user commands or by saving the current configuration. The scripts can be imported from and exported to RAD devices via file transfer protocols.

Although scripts can be created using a text editor, it is recommended to save the configuration file and then edit it rather than write a script from scratch. The sequence of the commands is very important and if a script fails during startup at a certain command, the entire configuration file is discarded.

Chapter 2

Management Configuration

2.1 Management Topology



Management station is connected to MP-4100 CL.2 via ETH-MNG port of CL-A.

MP-4100 CL.1 is reached via DCC over the STM-1 link.

Standalone ASMi-54L is managed inband.

Standalone OP-108 is managed through OP-108C menu.

Hosts Configuration via Terminal

Before you can get started on configuring services you will need to set up Host Management on all devices. In this task you will log on to each device via Terminal, configure the Host parameters and open up necessary management links between devices.

The Megaplex-4100 Phase 3 will provide the clock during this whole workshop.

Connecting the Cables

1. Connect **ETH Straight** cable between Management Station and **CONTROL-ETH** port on CL-A, MP-4100 CL.2.

2. Connect **LC-LC** Fiber cable between **SDH** port **#1** on CL-A, MP-4100 CL.2 and **LINK** port **#1** on CL-A, MP-4100 CL.1.
3. Connect **CH-1** of **CBL-DB26-8SHDSL** cable (MP-4100CL.2) to the **SHDSL** port of the ASMi-54L.
4. Connect SC-LC Fiber cable between OP-108C, Link #1 (MP-4100 CL.1) and OP-108 standalone unit, **Link A**.

Configuring the Management Station

The Management station is pre-configured with the following IP address:

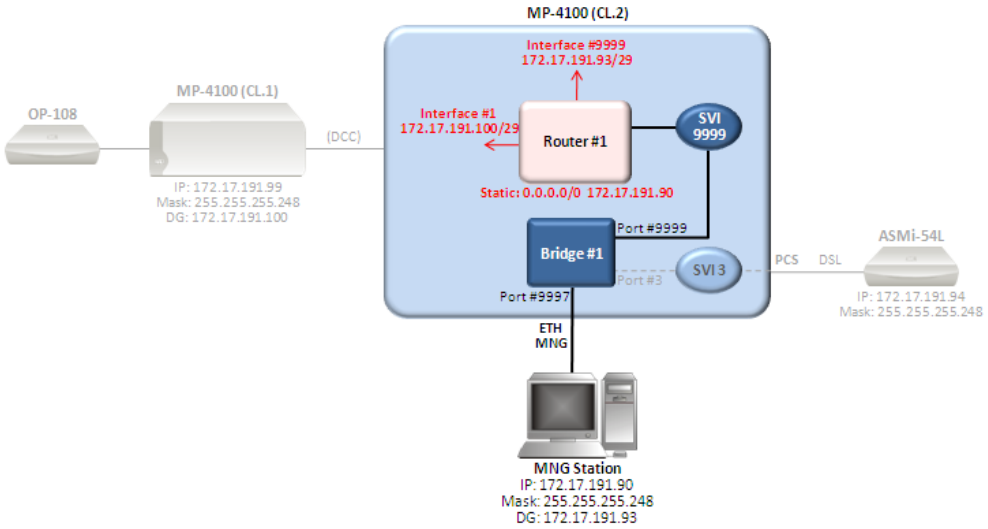
```
IP =    172.17.191.90
Mask =  255.255.255.248
Default Gateway = 172.17.191.93
```

Mask **255.255.255.248** defines a subnet pool with IP address range from 172.17.191.89 to 172.17.191.94.

Overview

When approaching a device for initial configuration it is recommended to set the devices to default configuration.

2.2 Configuring Local MP-4100 (CL.2) Management



Management access

1. Connect the terminal cable to “Control DCE” port.
2. Open the terminal application and set the baud-rate to 9600.
3. Type the user name (**su**) and password (**1234**).

Configuring MP-4100 CL.2

☛ *Reminder: MP-4100 CL.2 configuration is done by CLI*

1. Factory Default setup:
   `file delete startup-config`
   `admin reboot`
2. Type **`yes`** to confirm the reboot. Wait until you get the prompt again.
3. View the default setting of the router Interface:
   `configure router 1`
   `info detail`

```
interface  9999          <default interface for host IP ONLY!>
    address  0.0.0.1/0
    name  "Put your string here"
    bind  svi  9999      <the default Service Virtual Interface that connects
                           router interface    # 9999 to bridge port # 9999>
    no vlan
    no shutdown      <indicates that the interface is in open state by default>
exit
arp-timeout  1200
```

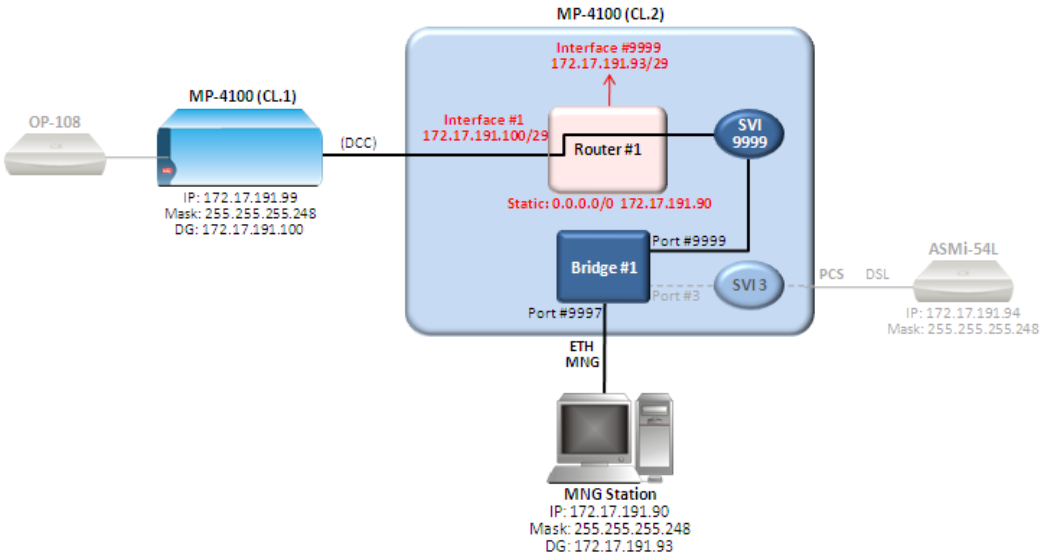
4. Set the Host IP that will be used to access the local device via IP:
   `Interface 9999`
   `address 172.17.191.93/29` (the same sub-network as the Management PC).
5. Add a general Static route to reach the MNG station:
   `exit`
   `static-route 0.0.0.0/0 address 172.17.191.90`
6. Save the configuration :
   `exit all`
   `commit` (updates the configuration changes to the running database)
   The following messages must appear:

```
Result : Warning   <installed modules are not yet configured
in the database, hence the warning>

Slot          CL-B     (W102)MODULE TYPE MISMATCH

Slot          01       (W102)MODULE TYPE MISMATCH

Slot          02       (W102)MODULE TYPE MISMATCH

Slot          03       (W102)MODULE TYPE MISMATCH
```

save (copies the running configuration to the startup configuration)

7. Verify connectivity (ping/telnet) between the MNG station and MP-4100 (ping 172.17.191.93 –t from MNG station)

2.3 Configuring Remote MP-4100 (CL.1) Management



Configuring MP-4100 CL.2

In order to reach MP-4100 CL.1 from the management station connected to MP-4100 CL.2 we have to arrange inband management channel (DCC).

1. Create a new router interface:

```
exit all

configure router 1
```

```
interface 1

no shutdown
```

2. Assign IP address to this RI (Router Interface). It must be from a **different** sub-network than the HOST IP:

```
address 172.17.191.100/29
```

Mask **255.255.255.248** defines a subnet pool with IP address range from 172.17.191.97 to 172.17.191.102

3. Bind Interface #1 to the STM-1 port #1 on CL-A:

```
bind sdh-sonet cl-a/1
```

4. Open a DCC (Data Communication Channel) on the same STM-1 link for Management:

```
exit all

config port sdh-sonet cl-a/1

dcc encapsulation hdlc mode d1-to-d3 routing-protocol
rip2
```

5. Save the configuration:

```
exit all

commit

save
```

Configuring MP-4100 CL.1

1. Connect the terminal cable to "Control DCE" port of MP-4100 CL.1.
2. Open the terminal application and set the baud-rate to **115200**.
3. Type user name (**su**) and password (**1234**).
4. Set up a Factory Default (Configuration>DB Tools>**Load HW**)
5. Save the configuration to the database (DB Update - **%**).
6. Verify Cards installed in the chassis (**Inventory > SW/HW rev**).
7. Set Host IP + Mask + Default Gateway (Quick Setup). IP address must be on the SAME network as Interface #1 of MP-4100 CL.2 (172.17.191.99):

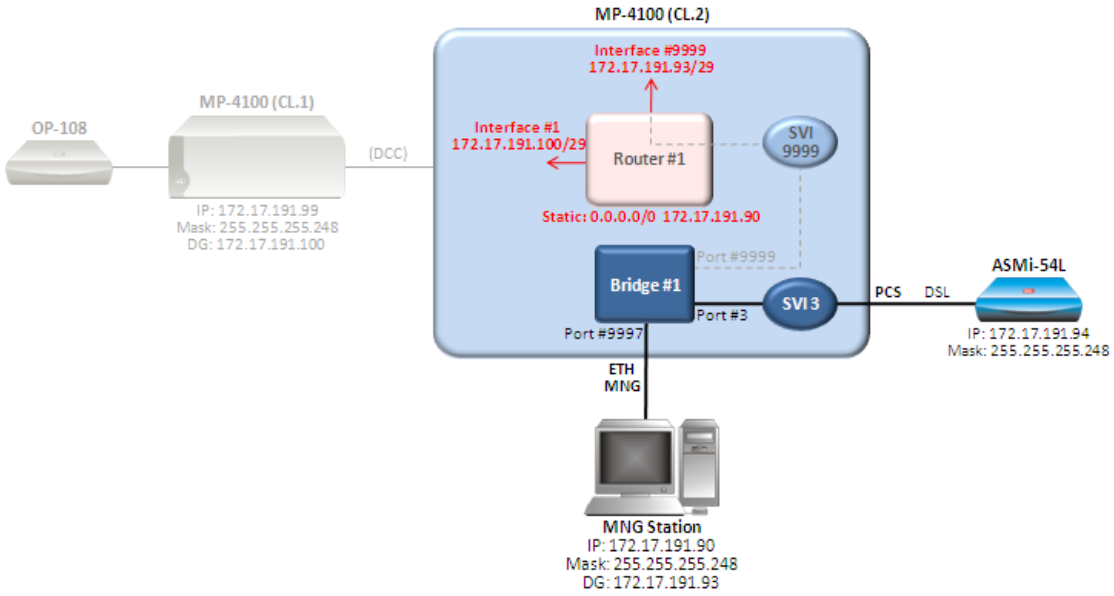
```
Configuration>Quick Setup
 1. Host IP Address... (172.17.191.99)
 2. Subnet Mask    ... (255.255.255.248)
 3. Default Gateway... (172.17.191.100)
```

8. Open a DCC on STM-1 link #1 of CL-A for Management (Configuration>Physical Layer>CL>CL-A>SDH/SONET>Link 1>**DCC Configuration**):

```
1. In Band Management>   (HDLC)

 2. Routing Protocol  >   (RIP 2)

 3. Management DCC    >   (D1-D3)

 4. Deviation Type        (Standard)
```

9. Save the configuration.
10. Verify connectivity (ping/telnet) to the MNG station (**ping 172.17.191.99 –t**).

2.4 Configuring Remote ASMi-54L Management



Configuring MP-4100 CL.2

1. Open a telnet session to MP-4100 CL.2 (**telnet 172.17.191.93**).
2. Verify the installed module in slot #1:

   configure

   show cards-summary

```
Slot  Family          Type              HW Ver     SW Ver

-------------------------------------------------------------

PS-A  Power Supply    ps                Undefined  Undefined
```

```
PS-B  Not Installed   --              Undefined  Undefined

CL-A  CL              CL2 622GbE      0.0/ 0.0   3.00B07/ 0

CL-B  Not Installed    --             Undefined  Undefined

1          DSL        ASMI54C          1         2.73

-  - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

SW versions may be different from the above.

3. Define the card type in the relevant slot:

   slot 1

   card-type dsl asmi54c

4. Open one SHDSL port:

   exit

   port shdsl 1/1 <refers to slot #1 / port #1 >

   no shutdown

5. Open a PCS (Physical Coding Sublayer) port and bind it to the above SHDSL port:

   exit

   pcs 1/1

   bind shdsl 1/1

   no shutdown

6. Add an SVI (virtual interface that connects PCS entity to the management interface)

   exit

   svi 3

   no shutdown

7. Verify the current Bridge port settings on default Bridge #1:

   exit all

   configure bridge 1

   info detail

```
#  Bridge Port Configuration
     port  9997 <Default bridge port for MNG-ETH port of CL-A>
         name  " Bridge port 9997"
         bind  mng-ethernet  cl-a/1
         no shutdown
     exit
#  Bridge Port Configuration
     port  9999 <Default bridge port for the Host IP interface>
         name  " Bridge port 9999"
         bind  svi  9999
         no shutdown
```

8. Create a new bridge port in default Bridge #1:

   ```
   port 3
   no shutdown
   ```

9. Bind the new SVI #3 to the new bridge port #3:

   ```
   bind svi 3
   ```

10. Define a classifier profile named "all" that allows all traffic type (classifier profiles specify the criteria for flows):

    ```
    exit all
    configure flows
    classifier-profile all match-all
    match all
    ```

11. Define a classifier profile named "**v100**" that allows only traffic tagged with Vlan 100:

    ```
    exit
    classifier-profile v100 match-all
    match vlan 100
    ```

12. Define a flow named "**mng_to_asmi**", forwarding management traffic from the MP-4100 to the ASMi-54L:


```
exit

flow mng_to_asmi

classifier all  <Accepts all incoming traffic>

vlan-tag push vlan 100 p-bit fixed 0 <Tag traffic with Vlan 100>

ingress-port svi 3 <Entry point of the Flow>

egress-port pcs 1/1 <Exit point of the Flow>

no shutdown
```

13. Define a flow named "**mng_from_asmi**", forwarding untagged traffic from the ASMi-54L to the MP-4100:


```
exit

flow mng_from_asmi

classifier v100   <Accepts only incoming traffic tagged with Vlan
                   100>

vlan-tag pop vlan   <Untag Vlan 100 from incoming traffic>

ingress-port pcs 1/1

egress-port svi 3

no shutdown
```

14. Save the configuration:

```
exit all

commit

save
```

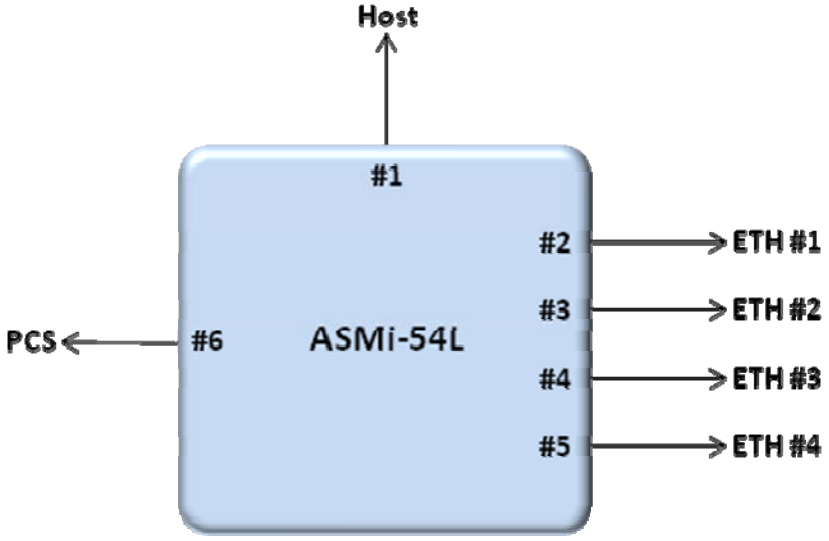
Configuring ASMi-54L

1. Connect the terminal cable to "Control DCE" port of ASMi-54L.
2. Open the terminal application, and set the baud-rate to **115200**.
3. Type the user name (**su**) and password (**1234**).
4. Perform Factory Default (Configuration>System>**Factory Defaults**).
5. Set bridge to **Aware** (Configuration>Applications>Bridge> **Vlan Mode**).
6. Press "**S**" to Save.
7. Define Host IP (**172.17.191.94**) and Mask (**255.255.255.248**) (Configuration>System>Management>**Host**).
8. Tag the Host traffic with Vlan 100 (Configuration>System>Management>Host>**Encapsulation**):

```
1. Host Tagging                    (Tagged)

2. Host VLAN ID [1 - 4094]  ...  (100)

3. Host Priority Tag [0 - 7]...  (0)
```

9. Press "**S**" to Save.
10. Press "**Esc**".
11. Press "**S**" to Save.

Allocating ASMi-54L Bridge Ports



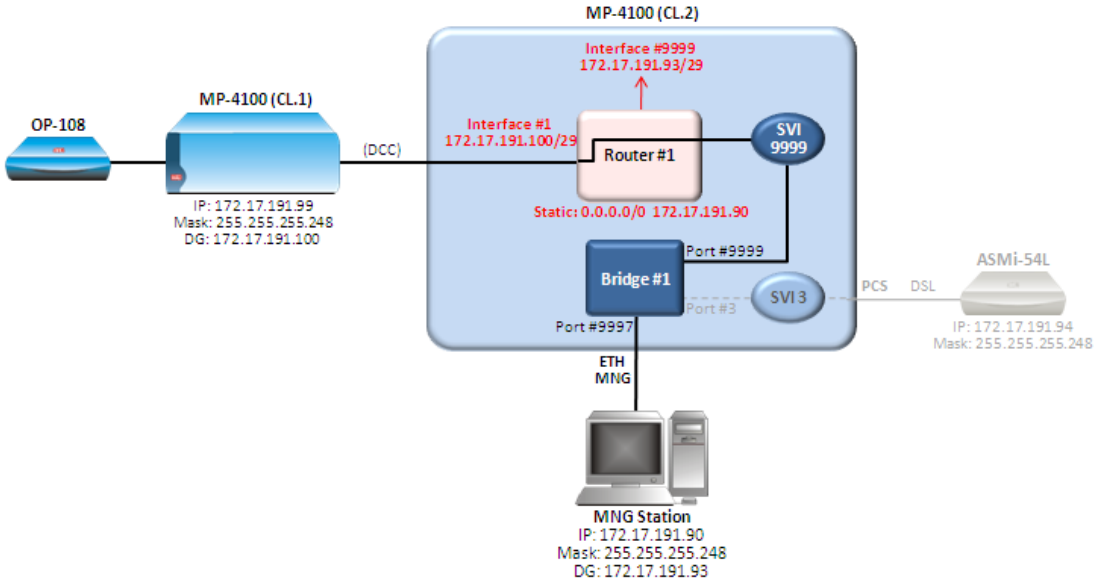
12. Configure a Vlan membership rule, sending traffic tagged with Vlan 100 towards the DSL uplink (port #6), and untagged traffic toward the unit's Host (port #1) (Configuration>Applications>Bridge>Vlan Membership):

    Use **A** (ADD) option to configure port tagging

```
1. Vlan Id[1 - 4094]      ...    (100)

2. Egress Tagged Ports    >      (6)

3. Egress Untagged Ports  >      (1)

4. Egress Unmodified Port>       (-)
```

13. Press "**S**" to Save.
14. Verify connectivity to the MNG station (**ping –t 172.17.191.94**).

2.5 Configuring OP-108 Management



Configuration steps in MP-4100 CL.1

1. Verify you DON'T have info about the remote OP-108 unit (Monitoring>Physical Layer>IO>I/O-2 (OP108C)>**Remote**).
2. Define the "far end type" as **OP108/ETH** (Configuration>Physical Layer>IO>I/O-2 (OP108C)).
3. Open the local fiber link (Configuration>Physical Layer>IO>I/O-2 (OP108C)>Local>**Link**).
4. Save the configuration (DB Update).

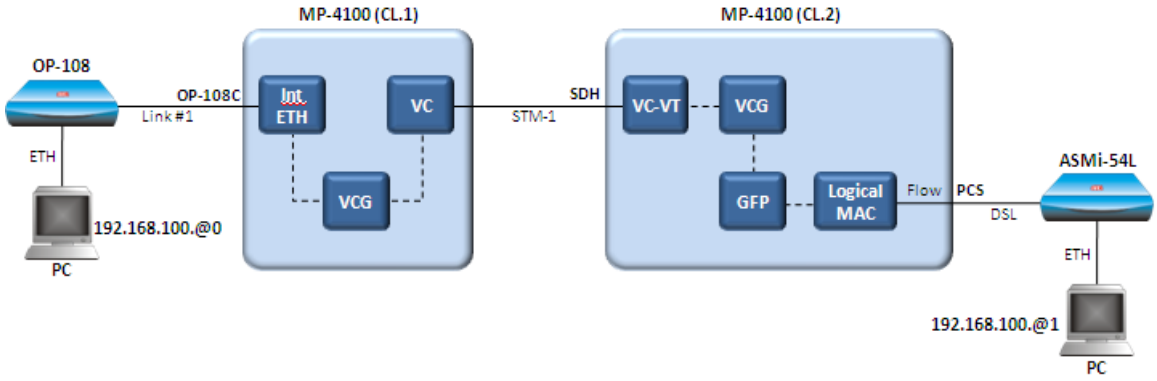
5. Verify you have access to the remote OP-108 unit (Monitoring>Physical Layer>IO>I/O-2 (OP108C)>**Remote**):

```
Device Type          >   (OP108/ETH)

Active Link          >   (Link 1)

Redundancy Status    >   (Not Available)

PS1 Type             >   (ACDC)

PS1 Status           >   (OK)

PS2 Type             >   (None)

PS2 Status           >   (Not Mounted)

Alarm Indication     >   (Normal )

Test Indication      >   (OFF)
```

Chapter 3

Ethernet over SDH

3.1 ETH Flow Structure



The Packet (Ethernet) Engine of MP-4100 is a state-of-the-art, multi-port GbE switching and aggregating block, which enables hardware-based Ethernet capabilities, such as traffic management, performance monitoring and OAM, between any of the Ethernet entities.

This Ethernet traffic is flow-based and in this workshop will be terminated by Internal Ethernet ports of OP-108C and ASMi-54C I/O modules carrying traffic generated by CPE devices and transferred over multiplexed fiber or SHDSL circuits.

SDH/SONET ports transfer ETH traffic by using Virtual or Contiguous concatenation (up to 32 VCG per CL.2) with GFP or LAPS and optional LCAS support.

The Ethernet engine flow classification mechanism is based on port (unaware mode) or VLAN (aware mode with pop/push or preserve capabilities).

3.2 Physical Connections

1. Connect the management PC station **Second** ETH port (192.168.100.@0) to the USER-ETH port of the OP-108 standalone unit, using an **ETH Straight** cable.
2. Connect **ETH Link #1** of the ASMi-54L standalone unit to the **ETH port** of the **Customer PC** station (192.168.100.@1), using an **ETH Straight** cable.
   @ = your group number.

3.3 Configuring MP-4100 CL.1

Since you have IP connectivity to all the units, you should use Telnet for any further configurations.

1. Set Internal ETH #1 on OP-108C (Configuration>Physical Layer>IO>I/O-2 (OP108C)>Local>Internal>**Int-ETH**) administrative status to **UP**.
2. Set **VCG #1** (Virtual Concatenated Group) administrative status to **UP**. The VCG controls the utilization of the bandwidth available on the link to the SDH network. (Configuration>Logical Layer>CL>VCAT>CL-A>**VCG 1**).

```
 1. Admin Status                          (Up)
 2. VC type                      >        (VC12)
 3. LCAS                            (No)
 4. Number of VCs [1 - 63]       ...      (1)
 5. Encapsulation                >        (GFP)
 6. User Name                    ...      ()
 7. Virtual Concatenation                 (Yes)
 8. Redundancy                            (None)
 9. LVC Configuration
10. GFP Configuration
```

3. Map **VCG #1** to Link #**1** of CL-A. The exact location should be **TU1**/**TUG2-1**/**TUG3-1** (Configuration>System>Mapping>CL-A>**Link 1**):

			TUG3-1
	TU1	TU2	TU3
TUG2-1	**VCG1**	None	None
TUG2-2	None	None	None
TUG2-3	None	None	None
TUG2-4	None	None	None
TUG2-5	None	None	None
TUG2-6	None	None	None
TUG2-7	None	None	None

4. Configure a **Flow** between VCG-1 and INT ETH port of OP-108C, including **SP-VLAN 10** (Configuration>Applications>Flows>**Mapping**>).

   Configuration steps are as follows:

   a. Press "**A**" to add flow #1

   b. Go to "**Bridge Port List**", and press "**A**" to add BP 351 (CL-A, VCG 1).

   c. Set the "**SP-VLAN**" to **10**.

   d. Press "**S**" to save the BP, and "**Esc**" to return to the Bridge Port List view.

   e. Press "**A**" to add the second BP 36 (**IO-2, Int-ETH 1**).

f. Press "**S**" to save the BP, and "**Esc**" to return to the Bridge Port List view. You should get the following table:

BP	C-VLAN Type	C-VLAN ID	SP-VLAN	Slot	Port	Rate	BP Name
351	**Unaware**	**0**	**10**	**CL-A**	**VCG 1**	**2.1Mbps**	
36	**Unaware**	**0**	**0**	**IO-2**	**Int-ETH 1**	**100Mbps**	

5. Save the configuration.

3.4 Configuring MP-4100 CL.2

1. Configure a VCG and bind/map the relevant VC's to it:

   exit all

   configure port vcg cl-a/1 <the first VCG out of 32 possible>

   bind vc-vt cl-a/1/1/1/1/1 <This path refers to: Common Logic in **Slot A**/SDH **Port 1**/STM-1 Number **1**/TUG 3 Number **1** /TUG 2 Number **1**/VC-12 Number **1**>

   no shutdown

2. Configure a **GFP** (Generic Framing Procedure) and bind the VCG to it:

   exit

   gfp cl-a/1 <the first gfp out of 32 possible>

   bind vcg cl-a/1

   no shutdown

3. Configure a **Logical MAC** and bind the GFP to it:

   exit

   logical-mac cl-a/1 <the first logical MAC out of 32 possible>

   bind gfp cl-a/1

   no shutdown

4. Configure a classifier named "**v10**" that accepts traffic with Vlan 10 only:

   exit all

   configure flows classifier-profile v10 match-all

   match vlan 10

5. Configure a flow named "**data_to_asmi**" between the Logical MAC and the PCS 1/1:

   exit

   flow data_to_asmi

   classifier v10

   ingress-port logical-mac cl-a/1

```
egress-port  pcs  1/1
no shutdown
```

6. Configure a flow named "**data_from_asmi**" between the PCS and the Logical MAC:

```
exit
flow  data_from_asmi
classifier  v10
ingress-port  pcs  1/1
egress-port  logical-mac  cl-a/1
no shutdown
```

7. Save the configuration :

```
commit
save
```

3.5 Configuring ASMi-54L

1. For this configuration use Telnet connection (172.17.191.94)
2. Configure bridge port #**2** (connected to ETH port #**1**) to add Vlan 10 on all incoming packets (Configuration>Applications>Bridge>**Bridge Port**):

```
   Bridge Port[2 - 6]              ... (2)
   Bind                            >   (ETH 1)
   Egress Tag Handling             >   (None)
1. Activation                      >   (Enable)
2. Ingress Filtering                   (Disable)
3. Accept Frame Type                   (All)
4. Port VID/Stacking VID[1 - 4094] ... (10)
5. Copy Original Priority              (Disable)
6. Default Priority Tag[0 - 7]     ... (0)
7. Ingress Tag Handling            >   (None)
8. TPID (Ether Type)[0 - ffff]     ... (8100)
```

3. Press "**S**" to save.
4. Add a Vlan membership rule, sending traffic tagged with vlan 10 toward the DSL uplink (port #**6**), and untagged traffic toward ETH port #1 (port #**2**) (Configuration>applications>Bridge>**Vlan Membership**):

```
1. Vlan Id[1 - 4094]     ... (10)
2. Egress Tagged Ports   >   (6)
3. Egress Untagged Ports >   (2)
4. Egress Unmodified Port>   (-)
```

5. Press "**S**" to save.

6. Verify connectivity (ping/telnet) between the 2 customer PC's (IP's are 192.168.100.@0 and 192.168.100.@1). **@** is your workstation number.

3.6 Checking the network utilization

a. Run the **iperf.exe** application on the Management PC second ETH port (192.168.100.@0) and configure it to **Server** mode as follows:

iperf.exe –s -u

b. Run the iperf.exe application on Customer PC (192.168.100.@1) and configure it to **Client** mode as follows:

iperf.exe -c 192.168.100.@1 –u –b 2m –t 30

c. The stream above is producing 2M traffic for 30 seconds.

d. Check the "Networking" tab on windows task manager, and verify the network utilization.

e. Wait till iperf finished the transmission and make sure that a report shows 0% packets loss.

f. Now, increase the iperf transmitting bandwidth to **4M**:

iperf.exe -c 192.168.100.@1 –u –b 4m –t 30

g. Wait till iperf finished the transmission and check its report. This time you should see around 50% packet loss. Try to understand the reason before you'll read an answer below:

Although ASMi-54L is providing around 5.7M of SHDSL uplink, we have only one VC (2M) under our VCG entity.

Increase BW capacity of our application by adding another VC to the existing VCG

1. On the MP-4100 CL.1 go to (Configuration>Logical Layer>CL>VCAT>CL-A) and change VCs number to **2**.
2. Add the second VC to **VCG #1** (Configuration>Logical Layer>CL>VCAT>CL-A>**VCG 1**) and map it to **TU1/TUG2-2/TUG3-1:**

	TUG3-1		
	TU1	TU2	TU3
TUG2-1	VCG1	None	None
TUG2-2	**VCG1**	None	None
TUG2-3	None	None	None
TUG2-4	None	None	None
TUG2-5	None	None	None
TUG2-6	None	None	None
TUG2-7	None	None	None

3. Save configuration

4. On MP-4100 CL.2, add the same VC to the existing VCG:

   `configure port vcg cl-a/1`

   `bind  vc-vt  cl-a/1/1/1/2/1`

5. Save configuration
6. Run the **4**M iperf stream, and make sure the BW utilization is OK.

After this task completion set Factory Default in Megaplex-4100 (CL.2):

`file delete starup-config`

`admin reboot`

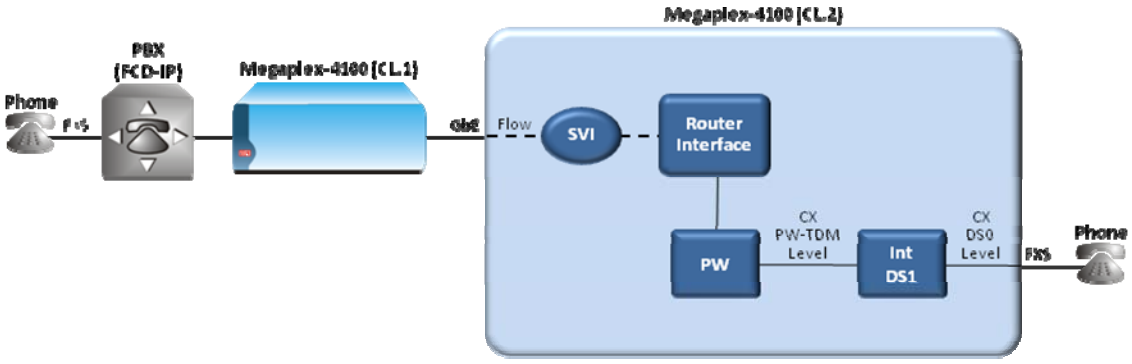
Type **`yes`** to confirm the reboot. Wait until you get the prompt again.

Please take into consideration that this operation will remove the inband management path and the next tasks configuration should be done with the hyper terminal.

Chapter 4

Voice over PSN

4.1 Application flow structure



In order to transfer voice traffic through a Packet Switching Network, MP-4100 should first convert PCM voice signal to ETH flow.

Digital voice signal coming from FCD-IP that simulates PBX is terminated by M8E1 module in MP-4100 CL.1.

Analog voice signal from phone set is terminated by VC-8FXS module in MP-4100 CL.2.

MPW-1 modules in both Megaplexes convert PCM voice signal to ETH flow transferred over GBE transport network.

4.2 Physical Connections

1. Connect RJ-11 cable between a phone set and FXS port **#1** on the FCD-IP.
2. Connect CBL-G703-8/RJ45/X to the 8E1 card of MP-4100 CL.1.
3. Connect channel **#1** of CBL-G703-8/RJ45/X cable to E1 **Link #1** of the FCD-IP unit.
4. Connect GbE link **#1** of MP-4100 CL.1 to GbE link **#1** of MP-4100 CL.2, using an **LC-LC fiber cable**.
5. Connect a phone set to FXS port **#1** on VC8-FXS card of the MP-4100 CL.2, using an **RJ-11 cable**.

4.3 Configuring MP-4100 CL.1

1. Open E1 port #1 of the 8E1 card (Configuration>Physical Layer>IO>I/O-1 (M8E1)>E1>Link 1 (**Up**)). Line type should be **G.732S**.
2. Open Internal DS1 #1 on the MPW card (Configuration>Physical Layer>IO>I/O-3 (MPW1)>**Int-DS1**). Framing mode should be **Framed** and Signaling should be **Yes**.
3. Assign time slot #**1** of Int-DS1 #**1** to time slot #**1** on Link **1** of the 8E1 card, with type **Voice** (...>Physical Layer>IO>I/O-3 (MPW1)>Int-DS1>Time Slot Assignment>**Manual**):

```
   Ts#       Slot              Port           Ts     Type
   TS 01    IO-1 (M8E1)        Link 1          1     VOICE
```

4. Open GbE port #**1** on CL.1 (Configuration>Physical Layer>CL>CL-A>Ethernet>GBE 1(**Up**)).
5. Add Router Interface #**1** (Configuration>Applications>Router>**Interface**). Add Vlan "**5**" to the traffic going out of this interface:

```
1. Number[1 - 100]   ... (1)
2. Name              ... (RI#1)
3. IP Address ... (30.0.0.20)  <local IP address of Router Interface #1>
4. IP Mask    ... (255.255.255.0)
5. Slot    >   (CL-A(CL1/155GbE))  <Physical interface used by this  Router Interface>
6. Port       >   (GbE 1)
7. VLAN ID[1 - 4094] ... (5)
```

6. Add a Default Gateway **30.0.0.1** (Configuration>Applications>**Router**).
7. Add Peer #**1** (Configuration>Applications>Router>**Peers**):

```
1. Peer Number[1 - 100]  ... (1)
2. Name                  ... (Peer-1)
3. Peer IP Address       ... (30.0.0.10)<this is the Router Interface address of the remote MP-4100>
4. Peer Next Hop Address ... (0.0.0.0)
```

8. Add PW #**1** (Configuration>Applications>Multi service over PSN>**PW**).
9. Verify the PW's **General** parameters (Configuration>Applications>Multi service over PSN>PW>**General Parameters**):

```
PW Number[1 - 640]        ...       (1)
    Slot                     >     (IO-3)
    Name                    ...          (PW-1)
 1. PW Type                  >     (TDMoIP CE)
 2. PSN Type                       (UDP/IP)
 3. Peer Number[1 - 100]     ...   (1)
 4. OAM Mode                       (Disabled)
 5. Out PW Label[1 - 8063]   ...   (1)
```

```
 6. In  PW Label[1 - 8063]    ...   (1)
```

10. Verify the PW's **PSN parameters** (Configuration>Applications>Multi service over PSN>PW>**PSN Parameters**):

```
        PW Number[1 - 640]  ...          (1)
    Slot                >           (IO-3)
    Name                ...         (PW-1)
    PW Type             >           (TDMoIP CE)
 1. TOS[0 - 255]        ...         (0)
 2. Vlan Priority[0 - 7]...         (0)
 3. Payload Format                 (V2)
```

11. Verify the PW's **Service parameters** (Configuration>Applications>Multi service over PSN>PW>**Service Parameters**). Change the Sensitivity to **Delay**:

```
    PW Number[1 - 640]                      ... (1)
    Name                                    ... (PW-1)
    PW Type                                 >   (TDMoIP CE)
 1. TDM Bytes In Frame(x48 Bytes)[1 - 30]   ... (1)
    Payload Size(Bytes)[4 - 1440]           ... (48)
 2. Jitter Buffer [usec][2500 - 200000]     ... (2500)
 3. Far End Type                            >   (E1)
 4. Sensitivity                                 (Delay)  <Relevant  for delay sensitive
voice traffic>
 5. Voice OOS[0 - ff]                       ... (00)
 6. Data OOS[0 - ff]                        ... (00)
 7. OOS Signaling                           >   (Forced Idle)
 8. Attachment Circuit                      >
```

12. Attach the relevant circuit (Time slot #**1** of Internal DS1 #**1** of the MPW card) to the PW (...tions>Multi service over PSN>PW>Service Parameters>**Attachment Circuit**):

```
    PW Number[1 - 640]   ... (1)
 1. Slot                  >   (IO-3)
 2. Int-DS1 Number[1 - 8]... (1)
 3. Time Slots            >   (1)
```

13. Check flow #**2** on the Flow mapping table (Configuration>Applications>Flows>**Mapping**):

```
1. Flow           [1 - 250] ...    (2)
 2. Name                    ...    (RI#1)
 3. Bridge Port List                      []>
```

14. Note that this flow has been added automatically between GbE port #**1** and IO-3 (the MPW card) **RI #1** (Configuration>Applications>Flows>Mapping>**Bridge Port List-Flow2**):

```
BP    C-VLAN Type C-VLAN ID SP-VLAN       Slot   Port   Rate
359   Aware       5     0           CL-A   GbE 1  1Gbps
501   Aware       5     0           IO-3   RI#1   ---------
```

This screen may appear after data base update.

15. Update the configuration.

4.4 MP-4100 CL.2 configuration steps

1. Define the VC-8/FXS and the MPW cards in the system:

```
configure slot 2
card-type voice vc8fxs
exit
slot 3
card-type pw mpw1
```

2. Open GbE #1 on the CL-A:

```
exit all
configure port ethernet cl-a/1
no shutdown
```

3. Open Internal DS1 #1 on the MPW card. Signaling should be **enabled**:

```
exit
ds1 3/1
signaling
no shutdown
```

4. Open analog port #**1** on the voice card, with **CAS** signaling:

```
exit
voice 2/1
signaling cas
no shutdown
```

5. Add a cross connection on the **DS0** level between the MPW internal DS1 time slot #**1** to the VC8 analog port #**1** :

```
exit all
configure cross-connect
ds0 ds1 3/1 ts 1 voice 2/1
```

6. Add a cross connection on the **PW** level between PW #**1** to the MPW internal DS1 time slot #**1**:

```
pw-tdm pw 1 ds1 3/1 time-slots 1
```
<This is the attachment circuit>

7. Configure a PW:

```
exit all
```

```
configure pwe
pw 1 type tdmoip-v2 psn udp-over-ip
sensitivity      <PW behavior is now delay sensitive>
peer 1
no shutdown
```

8. Create Peer #**1**:

```
exit all
configure peer 1 ip 30.0.0.20   <this is the Router Interface
                                 address of the remote MP-4100>
```

9. Configure a new SVI port #**5**:

```
exit all
configure port svi 5
no shutdown
```

10. Configure a Default Gateway on Router #**2**:

```
exit all
configure router 2
static-route 0.0.0.0/0 address 30.0.0.1
```

11. Create Interface #**1** on Router #**2**:

```
interface 1
address 30.0.0.10/24
```

12. Bind the new RI to SVI #**5**:

```
bind svi 5
```

13. Add a classifier profile named "**v5**", accepting only traffic tagged with Vlan 5:

```
exit all
configure flows
classifier-profile v5 match-all
match vlan 5
```

14. Add flow named "**voice_to_GbE**", forwarding traffic tagged with Vlan 5 from SVI #**5** to the GbE interface:

```
exit
flow voice_to_GbE
classifier v5
ingress-port svi 5
egress-port ethernet cl-a/1
no shutdown
```

15. Add flow named "**voice_from_GbE**", forwarding traffic tagged with Vlan 5 from the GbE interface to SVI #**5**:

```
exit
flow voice_from_GbE
classifier v5
ingress-port ethernet cl-a/1
egress-port svi 5
no shutdown
```

16. Save the configuration:

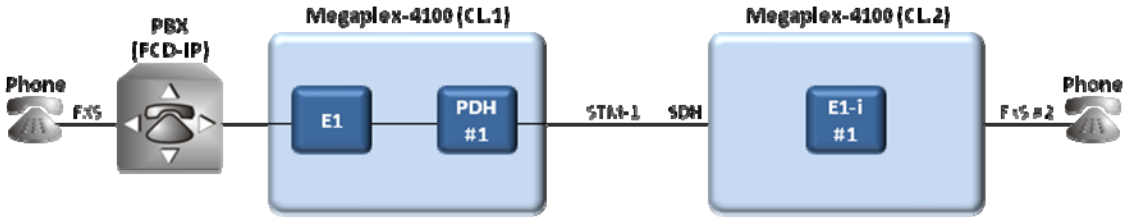
```
exit all
commit
save
```

17. Verify voice connectivity between the 2 phone sets.

Chapter 5

Voice over SDH

5.1 Application flow structure



In order to transfer voice traffic through an SDH Transport Network, analog or digital voice channels should be assigned to the corresponding E1 channels and then mapped to STM-1 frame.

A digital voice signal coming from FCD-IP that simulates the PBX is terminated by an M8E1 module in MP-4100 CL.1. An analog voice signal from the phone set is terminated by a VC-8FXS module in MP-4100 CL.2.

5.2 Physical Connections

1. Connect channel **#2** of the CBL-G703-8/RJ45/X cable (MP-4100 CL.1) to FCD-IP, E1 **Link #1**.
2. Connect **RJ-11** cable between phone set and MP-4100 CL.2, VC-8/FXS card, port **#2**.

5.3 MP-4100 CL.1 configuration steps

1. Open E1 port #2 of the 8E1 card.
2. Open PDH **#1** (Configuration>Physical Layer>CL>**PDH**). Frame type should be **G.732S**.
3. Assign time slot **#1** of PDH **#1** to time slot **#1** on E1 **#2** of the 8E1 card, with type **Voice**.

4. Map PDH #**1** to **TUG3-1**/**TUG2-1**/**TU2** on STM-1 link #**1**.
5. Save the configuration.

5.4 Configuring MP-4100 CL.2

1. Open analog port #**2** on the voice card, with **CAS** signaling.
2. Open **E1-i #1** (PDH #**1**) on **CL-A**
   ```
   configure port e1-i cl-a/1
   no shutdown
   ```
3. Add a cross connection on the **DS0** level between **E1-i #1** time slot #**1** to the VC8 analog port #**2**
   ```
   exit all
   configure cross-connect
   ds0 e1-i cl-a/1 ts 1 voice 2/2
   ```
4. Map **E1-i #1** to **TUG3-1**/**TUG2-1**/**TU2** on STM-1 link #**1** (prompting: use cross connect on the SDH-SONET level between the relevant vc12-vt2 and the E1-i)
   ```
   sdh-sonet vc12-vt2 cl-a/1/1/1/1/2 e1-i cl-a/1
   ```
5. Save the configuration.
6. Verify voice connectivity between the 2 phone sets.

5.5 Summary

You have just completed the Next Generation MAP & First Mile workshop. Now you are able to prepare and install access applications with data and voice services extension over GBE and SDH transport networks.

You've learnt how to control MAP equipment supported menu or CLI configuration options by ASCII Terminal or Telnet.

We hope this new knowledge will help you in your daily work.